Department of Toxic Substances Control

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September 25, 2014

Mr. David Dassler
The Boeing Company
5800 Woolsey Canyon Road
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Mr. John Jones
U.S. Department of Energy/ETEC
4100 Guardian Street, Suite 160
Simi Valley, California 93063

Mr. Peter Zorba
National Aeronautics and Space Administration
5800 Woolsey Canyon Road
Canoga Park, California 91304

REPORT ON ANNUAL GROUNDWATER MONITORING, 2013, SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY CALIFORNIA, DATED JANUARY 3, 2014

Dear Messrs. Dassler, Jones and Zorba:

The Department of Toxic Substances Control (DTSC) has reviewed the Report on Annual Groundwater Monitoring, 2013 dated January 3, 2014 (report). The report was prepared by MWH Americas, Inc. It summarizes the groundwater monitoring activities conducted during 2013 at the Santa Susana Field Laboratory (SSFL) located in Ventura County, California. The report was reviewed by DTSC staff from the Cypress Geologic Services Unit (GSU). A technical memorandum (TM) presenting GSU's review findings is attached.

DTSC concludes that the report meets the general requirements of the applicable water quality sampling and analysis programs (WQSAPs) provided that several comments are addressed.

GSU's TM includes two general comments on the development of concentration limits and sampling monitoring wells with less than three feet of water. The TM also includes

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twelve specific comments on water level gauging, screening values, verification sampling, on-site and offsite detects and radiochemistry that need to be addressed.

If you have any questions, please contact me via e-mail at Roger.Paulson@dtsc.ca.gov or at (916) 255-3702.

Sincerely,

Roger N. Paulson, PE
Senior Engineer
Department of Toxic Substances Control

Attachments:
Technical Memorandum dated September 8, 2014 from T. Seckington, DTSC to R. Paulson, DTSC

cc: (via e-mail)

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MEMORANDUM

To: Roger Paulson
Project Manager
Brownfields and Environmental Restoration Program

From: Thomas M. Seckington, C.HG. TS
Senior Engineering Geologist
Geologic Services Branch

Date: September 8, 2014

Re: Report on Annual Groundwater Monitoring, 2013 dated January 3, 2014

PCA: 22120 Site Codes: 300232-48, 300122-48, and 300381-35

The Report on Annual Groundwater Monitoring, 2013 dated January 3, 2014 (report) was reviewed by Department of Toxic Substances Control (DTSC) staff from the Cypress Geologic Services Unit (GSU). The report was prepared by MWH Americas, Inc. The report summarizes the groundwater monitoring activities conducted during 2013 at the Santa Susana Field Laboratory (SSFL) located in Ventura County, California. As stated in the Objective section, the report presents the summary of: the monitoring programs and activities; inspections and modifications to the monitoring wells and equipment; deviations from the water quality sampling and analysis programs (WQSAPs); and water level measurements and laboratory analysis along with interpreted plume maps, tables, and graphs.

The information and data presented in this annual report, as with each groundwater monitoring report, is incorporated into the ongoing Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) work at the site and is evaluated with the associated and interdependent data. The focus of the review of the Annual and Quarterly Groundwater monitoring reports is to: ensure compliance with all relevant regulations; address any outstanding groundwater monitoring and data collection issues; and assess the adequacy of current groundwater data in supporting the data quality objectives (DQOs) of the RFI activities.

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This Annual Groundwater Monitoring report also included Appendix G, Development of Proposed Concentration Limits for Constituents of Concern at SSFL Regulated Units (Appendix G). Appendix G presents the approach in determining the concentration limits (CLs) for each constituent of concern (COCs) and the resultant CLs for each RCRA regulated unit at SSFL pursuant to California Code of Regulations (CCR),Title 22, Section 66264.97.

The GSU believes that the report and the work summarized within meets the general requirements of the applicable WQSAPs. The following comments and/or clarifications need to be addressed as indicated.

DEVELOPMENT OF THE CONCENTRATION LIMITS

CLs for COCs, presented in Appendix G, are set equal to the background concentration of each COC and are specific to each RCRA Regulated Unit. The CLs are used to determine if the operation of the regulated unit (i.e. surface impoundment) has caused or contributed to groundwater contamination. The CLs are calculated using the contaminant data from the upgradient (or background) well(s) to the regulated unit using methodologies that are consistent with the CCR and require approval by DTSC. Appendix G presents the process of calculating the CLs and presents the resultant values for approval by DTSC.

It should be noted that the approach described in Appendix G and used for calculating the CLs was approved by DTSC in a letter dated February 17, 2012. However, after reviewing the initial groundwater data and after further consideration of relevant sections of the CCR, the GSU recommends modification to how the CLs are determined for Category 1and 2 COCs. Further discussion is presented below.

Background

Category 1 COCs are those COCs that have never been detected in the background wells. The CLs, in these cases, are set equal to the practical quantitation limit (PQL). Since PQL will vary, CLs were set at the maximum PQL reported by the laboratory. The rationale is presented in Appendix G, which states "*The maximum PQL was selected because the PQL for an individual analyte can vary due to high concentrations of other constituents or other interferences, and so the maximum PQL is representative of what the laboratory can reasonably be expected to consistently achieved* [emphasis added] *based on the current dataset.*" Category 2 COCs are those COCs that have been detected but in less than 50% of the samples. For Category 2 COCs, the CLs are set equal to the higher of the maximum concentration or the maximum PQL reported by the laboratory.

For clarity, the relevant CCR citation language is paraphrased in the quotation above. The actual relevant CCR citation (CCR, Title 22, section 66264.97 (e)(9)(E)) states "*Any practical quantitation limit approved by the Department pursuant to subsection (e)(7) of*

this section that is used in the statistical method shall be the lowest concentration (or value) that can be reliably achieved within limits of precision and accuracy specified in the facility permit for routine laboratory operating conditions
[emphasis added] *that are available to the facility."* The language, "lowest concentration…reliably achieved… for routine laboratory operating conditions" implies that there will be situations where the analysis of a sample may not be routine. The situations where the PQL varies "due to high concentrations of other constituents or other interferences" as stated in Appendix G, would represent such situations. To address the high concentrations of other constituents or potential interferences in a sample, the laboratory must take additional steps including dilution and reanalysis of the sample(s). These steps typically result in higher PQLs and lower precision in the reported value or concentration.

It should be further noted that many of the proposed CLs (based on maximum PQLs) are above regulatory limits such as maximum contaminant levels (MCLs). This would be in violation of CCR, title 22, section 66264.94(e) and 66264.94(e)(1) which states:

"(e) In no event shall a concentration limit greater than background established under this section for a constituent of concern exceed any of the following:

(1) other applicable statutes or regulations (e.g., a maximum contaminant level (MCL) for that constituent promulgated under section 141.2 of the Safe Drinking Water Act (40 CFR Part 141 Subpart B) [P.L. 93-523, codified as Subchapter XII of the Public Health Service Act at 42 U.S.C. 300f; regulations establishing MCLs are located in 40 CFR Part 141, Subpart B])"

The GSU recommends that the CLs for Category 1 and 2 COCs be recalculated after the removal of elevated PQLs values that are a result of high concentrations or other interferences. Once these values are removed, the GSU believes that the elevated proposed CLs will fall below applicable regulatory limits.

Implementation of Approved CLs

CLs should be updated every two-years and presented, for DTSC review, in the third quarter groundwater monitoring report in odd-years beginning in 2015. The GSU recommends that the current proposed CLs be updated (in accordance with the comments in this memorandum) and submitted to DTSC within 30 days for review and approval.

For subsequent events, the GSU recommends the following schedule:

Updated CLs submitted	Calendar years to be used
2015, Third Quarter Groundwater Monitoring Report	2010 through 2015
2017, Third Quarter Groundwater Monitoring Report	2010 through 2017
2019, Third Quarter Groundwater Monitoring Report	2010 through 2019

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SAMPLING MONITORING WELLS WITH LESS THAT THREE FEET OF WATER COLUMN

The Sitewide WQSAP states "If the well is dry or the measured difference in depth between the depth of water and the well depth is less than three feet, the well contains insufficient water for sampling." Due to the current drought conditions being experienced in California, the GSU recommends that RPs should be given the discretion to purge and sample monitoring wells with less than three feet of water column.

SPECIFIC COMMENTS

1. **3.2 Water Level Gauging and Table 3**
   Page 3-3

   According to Table 3, RD-30 and RS-28 were inaccessible since "vault welded shut to prevent surface water from infiltrating the well." The sampling of these wells is not included in the post-closure permits or Site-wide WQSAP. It is not clear why these wells are noted in the monitoring reports. The GSU requests additional information on the history of both wells and will evaluate the need to formally include these wells in the monitoring program.

   Water levels were not collected from OS-02, OS-03, OS-04, OS-05, and OS-09 due to "artesian flow observed." The piezometric surface elevations are routinely calculated for flowing artesian wells and it is not clear why it cannot be done at these wells. It further raises the question if the well completions at the wells are adequate for flowing artesian wells. The uncontrolled release of water, either through the casings or through the well seals, should be addressed. The GSU recommends that the Boeing Company, National Aeronautics and Space Administration (NASA), and United States Department of Energy (DOE) evaluate each artesian well (onsite and offsite) to assess their conditions and submit a work plan(s) to modify the well completions so that piezometric surface elevations can be calculated and to ensure that flow from the wells is controlled, as necessary.

2. **4.2.2 Groundwater Screening Reference Values**
   Page 4-4; 10th paragraph

   "The methodology used to develop risk-based screening values for non-metals and chemicals without agency-published values is described in a technical memorandum included in Appendix 7-C of the draft groundwater RFI report (MWH, 2009). Groundwater screening reference values are presented in Table 9."

The rationale for the "reference values" presented in this section is reasonable for providing a context for comparison of reported concentrations for constituents that do not have a natural background concentration. However, the GSU recommends that the term "risk-based screening values" should not be used as risk-based screening values have not been established for groundwater at the site for metals or non-metals. Further, Table 9 references federal and state maximum contaminant levels (MCLs) as screening value but it should be noted these are not necessarily appropriate as final cleanup targets as they incorporate considerations other that risk to human health and the environment and, individually, cannot account for the cumulative risk associated with all contaminants that may be present in the groundwater. The values presented in Table 9 should therefore be viewed as reference values in assisting in characterization decisions not remediation/cleanup decisions.

3. **4.2.4.4 2013 Verification Sampling**
   Page 4-13; 1st paragraph

   "Voluntary follow-up sampling is performed in a similar manner to provide similar confirmation for constituents not on the Appendix IX list or at wells that are not part of the regulated units program."

   It is not clear what the criteria for "follow-up sampling" are for wells not in the RCRA monitoring program. Clarification is needed.

4. **4.2.5.1 On-site Detects**
   Page 4-15; 2nd paragraph

   There are no other wells located beyond monitoring wells RD-48B and RD-62 along projected pathways from source areas. As such, both wells should be sampled semi-annually beginning the first quarter of 2015. GSU will continue to evaluate the groundwater in this area to determine if additional monitoring points are necessary.

5. **4.2.5.1 On-site Detects**
   Page 4-17; 4th paragraph

   "RD-102 and RS-36 are not monitored under the current Regulated Unit or Site-Wide groundwater monitoring programs, but it is anticipated that sampling and analysis of dioxins for a second time at RS-36 may be performed in support of the Groundwater RFI Program (MWH, 2009, 2010b) when that well contains sufficient water for sampling [emphasis added]."

   There does not appear to be a clear commitment or approach to resampling RD-102 and RS-36. The GSU recommends that DOE and/or Boeing submit a clear,

formal approach to resampling these wells in the future.

6. **4.2.5.2 Off-site Detects**
Page 4-19; 1st paragraph

"Perchlorate is both a naturally occurring and anthropogenic compound, and the DTSC soil background study (URS, 2012) confirmed the presence of naturally occurring background concentrations of perchlorate in soil."

This statement could be interpreted to link the detected perchlorate concentrations in groundwater samples collected from monitoring wells RD-66, RD-36B, RD-36D, RD-38B, and RD-39B to a naturally occurring source rather than site activities. For clarity, GSU does not believe that there is adequate data to support this conclusion.

7. **4.2.5.2 Off-site Detects**
Page 4-19; 2nd paragraph

"The presence of dioxin congeners in past groundwater samples collected at SSFL has been attributed to the suspended sediment in the water (GWRC, 2000; Haley & Alrich, 2006). Dioxins are naturally occurring in soil (Agency for Toxic Substances and Disease Registry [ATSDR], 1998) and were detected in samples of shale units collected from SSFL corehole C-5 in January 2001 from a depth of 92 feet below ground surface at concentrations greater than surface soil ambient background concentrations (Sullivan, personal communication, 2005, 2006)."

The occurrence of elevated dioxins in C-5 coincided with elevated VOCs and were located directly downdip along a shale unit that "daylighted" at the Alfa Test Stand spillway and could have resulted from facilitated transport via cosolvent effects and/or colloidal processes. The GSU does not believe that the concentrations of dioxins detected in C-5 were naturally occurring or that there are compelling data at SSFL that dioxins occur naturally in the groundwater. Therefore the dioxins detected in RD-36C should be considered site-related.

8. **4.2.5.2 Off-site Detects**
Page 4-19; 3rd paragraph

"It is anticipated that sampling for PAHs at RD-34B may be repeated in support of the DQO Evaluation under the Master RFI Data Gap Work Plan (CH2M HILL, 2013).

There does not appear to be a clear commitment or approach to resampling RD-34B for PAHs. The GSU recommends that Boeing submit a clear, formal approach to resampling these wells in the future.

9. **4.2.5.3 Radiochemistry**
   Page 4-20; 5th paragraph

   Based on this first time detection of cesium-137 (Cs-137) in RD-33A, the GSU recommends that RD-33A be sampled during both first and third quarters of 2015.

10. **4.2.5.3 Radiochemistry**
    Page 4-21; 1st paragraph

    Based on new maximum values of the dissolved uranium isotopes in RD-86 and their combined exceedances of the California MCL for total dissolved uranium, the GSU recommends that RD-86 be sampled during both first and third quarters of 2015.

11. **4.2.5.3 Radiochemistry**
    Page 4-21; 6th paragraph

    Based on the first time detected on strontium-90 (Sr-90) in RD-95, the GSU recommends that RD-95 be sampled during first and third quarters of 2015..

12. **4.2.5.3 Radiochemistry**
    Page 4-22; 1st paragraph

    Based on the first time detected on strontium-90 (Sr-90) in RD-96, the GSU recommends that RD-96 be sampled during first and third quarter of 2015 for Sr-90.

If you have any questions please feel free to contact me at (714)484-5424 or at tom.seckington@dtsc.ca.gov.